Remarks

Claims 1 – 7 and 73 – 76 have been pending. (It appears that the Examiner has mistakenly identified the pending claims as 1 – 5 and 73 – 76 in item 4 of the Office Action Summary. The Examiner addresses claims 1 – 7 and 73 – 76 in the body of the Office Action, however.) Claims 8 – 72 and 77 – 83 have been withdrawn from consideration. Claim 4 is being canceled. Claim 1 is being amended.

Applicants are hereby amending claim 1 to recite the limitation of claim 4 (which is thus being canceled). This amendment limits the aperture mask to repositionable polymeric aperture masks (basis therefor being found, for example, in original claim 4).

Rejections Under 35 U.S.C. Section 103

Claims 1, 2, 4, 5, and 73 – 75 were rejected under Section 103(a) as being unpatentable over the combination of U.S. Patent No. 5,534,969 (Miyake) and U.S. Patent No. 4,335,161 (Luo). The rejection is respectfully traversed for the following reasons.

Miyake discloses an alignment method and a positioning apparatus that enables alignment between a photomask and a large substrate.

Luo discloses a method for preparing a thin film transistor (TFT) by vapor depositing the semiconductive pads and the source and drain connections thereto through a single metal aperture mask.

In contrast, Applicants disclose deposition techniques using flexible repositionable polymeric aperture masks to create integrated circuits or integrated circuit elements. Specifically, Applicants disclose a method comprising positioning a repositionable polymeric aperture mask in proximity to a deposition substrate; stretching the aperture mask to align the aperture mask with the deposition substrate; and depositing material through the stretched aperture mask to form a layer on the deposition substrate.

The Examiner has asserted that "[i]t would have been within the scope of one of ordinary skill in the art to combine the teachings of Miyake and Luo to enable formation of the deposited material and for the reasons discussed in Luo."

However, in view of Applicants' amended claims, the Examiner has failed to establish a prima facie case of obviousness. According to MPEP Section 2143, a criterion for establishing a prime facie case of obviousness is that "the prior art reference (or references when combined) must teach or suggest all the claim limitations." It appears that neither Miyake nor Luo teach or suggest all of Applicant's claim limitations.

Applicants' claims include the limitation that material is deposited through a repositionable polymeric aperture mask. Luo teaches the use of metal aperture masks, and Miyake teaches the use of polymeric photomasks. Photomasks, however, are very different than aperture masks. Photomasks are typically a clear sheet of plastic with a pattern of ink printed or drawn on it. The pattern on the photomask is transferred to a photosensitive surface of a substrate by utilizing a light exposure technique. In contrast, aperture masks have openings therein, which are commensurate in size, shape, and relative position of the circuit elements (for example, semiconductor pads or source and drain contacts) to be deposited therethrough. Luo teaches that suitable materials for aperture masks include metals such as copper, beryllium, tantalum, aluminum, nickel, and alloys thereof (column 4, lines 14 – 17). Thus, neither Miyake nor Luo appear to teach or suggest the use of repositionable polymeric aperture masks. The Examiner has therefore failed to establish a prima facie case of obviousness.

Furthermore, assuming for the purposes of argument that a prima facie case of obviousness has been properly established, Applicant's claimed invention is nonetheless unobvious and patentable over the applied combination of references in view of the unexpected results accomplished using Applicants' method. As noted in the background section of Luo, aperture mask alignment, or registration, can be a problem during TFT fabrication (see, for example, column 1, lines 54 – 65). Surprisingly, Applicants have discovered that stretching techniques can be used to facilitate alignment of flexible, repositionable polymeric aperture masks for a deposition process (see, for example, page 10, lines 23 – 24, of Applicants' specification). By stretching the aperture mask, misalignment (for example, misalignment due to thermal expansion) can be greatly minimized (see, for example, page 11, lines 15 – 16, of Applicants' specification).

Neither Miyake nor Luo appear to teach or suggest stretching an aperture mask to align the aperture mask with a deposition substrate. Luo does not appear to teach or disclose stretching at all. Miyake discloses stretching a photomask to align the photomask with a substrate. As

discussed above, however, photomasks are very different than aperture masks. Unlike aperture masks, photomasks (which are film-like or sheet-like (Luo, column 1, lines 16 – 18)) do not typically have openings or apertures therein. The ink on a photomask does not generally contribute to the mechanical properties/characteristics of the mask. One of ordinary skill in the art would not have known how a polymeric mask (which typically has a thickness of approximately between 5 and 50 microns (see, for example, page 2, lines 1 – 2, of Applicants' specification)) comprising openings or apertures therein, which do contribute to the mechanical properties/characteristics of the mask, would stretch. The amount of stretching of the aperture mask in one or more directions can be greater than approximately 1 percent (see, for example, page 10, lines 29 – 31, of Applicants' specification). It would not have been obvious to one of ordinary skill in the art that repositionable polymeric aperture masks could be stretched such that alignment of the apertures could be achieved.

The Examiner has also asserted that one of ordinary skill in the art would have been led to the recited dimensions and width through routine experimentation to achieve desired device dimensions. Claims 73 – 76 are unobvious and patentable over Miyake and Luo because they contain the limitation of a repositionable polymeric aperture mask (see above). These claims find further patentability, however, in their recited dimensions.

Claim 73 contains the limitation that the aperture mask includes a patterned area with a dimension greater than a centimeter. Patterns having these widths can be useful in creating various circuits over a larger surface area. These patterns, which can be the width of a web or the length of a roll, can be used in a deposition process to create circuit elements that are distributed over a large surface area and separated by large distances (see, for example, page 5, lines 27 – 30, of Applicants' specification). In this manner, circuit elements separated by larger than conventional distances can be created using a deposition process. This feature may be advantageous, for example, in the fabrication of large area flat panel displays or detectors (see, for example, page 6, lines 1 – 7, of Applicants' specification).

Claims 74 and 75 contain a further limitation on the width of at least one deposition aperture (less than approximately 1000 microns in claim 74 and less than approximately 50 microns in claim 75). Apertures of these sizes are particularly useful in creating small circuit

elements for integrated circuits (see, for example, page 2, lines 6 – 7, of Applicants' specification).

In view of the foregoing, Applicants' invention is unobvious and patentable over the combination of Miyake and Luo, and Applicants therefore respectfully request that the rejection under Section 103(a) based on this combination be withdrawn.

Claim 3 was rejected under Section 103(a) as being unpatentable over the combination of U.S. Patent No. 5,534,969 (Miyake) and U.S. Patent No. 4,335,161 (Luo) in view of U.S. Patent Application Publication No. 2003/0160325 (Yoneda et al.). The rejection is respectfully traversed for the following reasons.

Yoneda discloses a conductive layer that is formed on the back surface of a silicon substrate by using a mask which is formed by a patternized resist on the back surface of the silicon substrate.

The Examiner has asserted that Yoneda discloses "positioning the aperture mask under the deposition substrate, wherein stretching the aperture mask reduces sag in the aperture mask." But, Yoneda does not appear to teach or suggest stretching a repositionable polymeric mask in order to reduce sag. In fact, Yoneda's mask is formed from a resist material. Resist generally does not sag, and is generally not stretchable. Therefore, neither Miyake, Luo, nor Yoneda appear to teach or suggest stretching a repositionable polymeric aperture mask in order to reduce sag in the aperture mask, and Applicants respectfully request that the rejection under Section 103(a) based on the combination of Miyake and Luo in view of Yoneda be withdrawn.

Claim 6 was rejected under Section 103(a) as being unpatentable over the combination of U.S. Patent No. 5,534,969 (Miyake) and U.S. Patent No. 4,335,161 (Luo) in view of U.S. Patent No. 6,589,382 (Clark et al.). The rejection is respectfully traversed for the following reasons.

Clark discloses an alignment device for permitting a deposition mask to be positioned relative to a substrate to facilitate simultaneous deposition of organic material on to the substrate which will be part of an organic light emitting device (OLED).

The Examiner has asserted that it would have been within the scope of one of ordinary skill in the art to combine the teaching of Miyake and Luo with Clark's teaching of depositing a layer of an organic material through a mask to form an OLED. Clark, however, does not appear to teach or suggest the use of a repositionable polymer aperture mask. Therefore, neither Miyake, Luo, nor Clark appear to teach or suggest stretching a repositionable polymeric aperture mask to align the

mask with the deposition substrate, and Applicants respectfully request that the rejection under Section 103(a) based on the combination of Miyake and Luo in view of Clark be withdrawn.

Claim 7 was rejected under Section 103(a) as being unpatentable over the combination of U.S. Patent No. 5,534,969 (Miyake) and U.S. Patent No. 4,335,161 (Luo) in view of U.S. Patent No. 6,259,408 (Brady et al.). The rejection is respectfully traversed for the following reasons.

Brady discloses a radio frequency identification (RFID) transponder comprising a substrate with a RFID integrated circuit mounted thereon.

The Examiner has asserted that it would have been within the scope of one of ordinary skill in the art to combine the teachings of Miyake and Luo with the RFID integrated circuit of Brady. Brady, however, does not appear to teach or suggest the use of a repositionable polymer aperture mask. Furthermore, Brady is using a metal screening mask in order to screen print a conductive paste material onto the substrate to form an antenna circuit. There is no motivation in the references themselves or in the knowledge generally available to one skilled in the art to combine the teachings of Miyake and Luo with the teachings of Brady. Therefore, Applicants respectfully request that the rejection under Section 103(a) based on the combination of Miyake and Luo in view of Brady be withdrawn.

Claim 76 was rejected under Section 103(a) as being unpatentable over the combination of U.S. Patent No. 5,534,969 (Miyake) and U.S. Patent No. 4,335,161 (Luo) in view of U.S. Patent No. 5,626,784 (Simons). The rejection is respectfully traversed for the following reasons.

Simons discloses a method for aligning a mask to a workpiece.

The Examiner has asserted that "Simons discloses sequentially depositing a number of materials on the deposition substrate through a number of repositionable polymeric aperture masks to define an integrated circuit (col. 5, lines 20 – 30)." Applicants', however, fail to find such a disclosure in Simons. In addition Simons does not appear to teach or suggest the use of a repositionable polymer aperture mask. In fact, Simons appears to teach away from polymer aperture masks. Simons states that while "this invention is disclosed for adjusting dimensions within a photolithographic mask formed of a polymeric material, it may be adapted for adjusting dimension within other types of masks . . . this invention may be employed to adjust dimensions of a metal mask of the type having openings for depositing material onto selective regions of a substrate, such as by vapor deposition or printing" (column 5, lines 20 – 30). In other words,

Simons discloses using polymeric materials for photolithographic masks, but specifically teaches using metal for masks having openings for depositing material onto selective regions of a substrate by vapor deposition (that is, for aperture masks). Therefore, neither Miyake, Luo, nor Simons appear to teach or suggest polymeric aperture masks or sequentially depositing a number of materials on the deposition substrate through a number of repositionable polymeric masks. Applicants therefore respectfully request that the rejection under Section 103(a) based on the combination of Miyake and Luo in view of Simons be withdrawn.

Concluding Remarks

Reconsideration and allowance of Applicants' claims are respectfully requested.

Respectfully submitted,

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